FY 2019 Competition Information Sheet

Program Name

Modeling, Analysis, Predictions, and Projections (MAPP) Program.

Program Mission

The mission of the Modeling, Analysis, Predictions, and Projections (MAPP) Program is to enhance the Nation's capability to predict variability and change in Earth's climate system. The MAPP Program focuses on the coupling, integration, and application of Earth System models and analyses across NOAA, among partner agencies, and with the external research community. Primary objectives include: 1) improving Earth System models; 2) supporting an integrated Earth System analysis capability; 3) improving methodologies for global to regional-scale analysis, predictions, and projections; and 4) developing integrated assessment and prediction capabilities relevant to decision makers based on climate analyses, predictions, and projections.The MAPP Program sits within the Earth System Science and Modeling Division of the NOAA Office of Oceanic and Atmospheric Research (OAR) Climate Program Office (CPO).

Focus for FY19

Climate Process Teams - Translating Land Process Understanding to Improve Climate Models

[Note, there is an additional Climate Process Team call through the CVP Program called "Climate Process Teams - Translating Ocean and/or Atmospheric Process Understanding to Improve Climate Models". Please see the relevant CVP Information Sheet for additional details.]

Proposals may target only one of the FY 2019 MAPP competitions, which must be clearly identified in the proposal summary.

Funding for FY19

Pending the availability of funds in FY 2019, the MAPP program anticipates a funding allocation of $1,000,000 for this competition. Total funding for this competition may exceed this amount, conditional on partners' contributions.

The range of funding for each Climate Process Team proposal (the combined budgets of all collaborators comprising the team) should be $600,000 to $1,000,000/year. Awards will be made for up to three years with a possibility of a two-year extension for teams that have met their second year milestones and are performing satisfactorily toward their third year milestones, conditional on funding availability. It is anticipated that 1-2 Climate Process Teams may be funded as a result of this competition. Awards will be funded in partnership with the Department of Energy (DOE), Office of Science, Earth and Environmental Systems

Modeling Program, and other agencies participating in US-CLIVAR and the U.S. Global Change Research Program, as appropriate. Successful proponents may be required to also submit their proposals to partnering agencies to receive funding.

Competition Information

Title: Climate Process Teams - Translating Land Process Understanding to Improve Climate Models

Climate models are used for a variety of practical applications, including forecasting meteorological conditions from weeks to years out and projecting long-term changes; they are the basis for information on the likelihood of future extreme events such as droughts, heat waves and coastal flooding. Climate models' information broadly supports climate related activities across the federal government, states and private entities. For example, such models support the National Climate Assessment[1] and U.S. participation in the Intergovernmental Panel for Climate Change (IPCC). Increasing the usefulness of climate model information crucially depends on our ability to reduce model errors by improving the realism in the simulation of climate system processes.

To address this need, US-CLIVAR Climate Process Teams (CPTs)[2] were formed as groups of observationalists, theoreticians, process modelers, and model developers working closely together to improve parameterizations of a particular process in one or more IPCC-class models. Over the past decade, several CPTs have been supported by federal agencies participating in the US Global Change Research Program (USGCRP) and US-CLIVAR. Based on this past work, there is strong recognition from the community[3] that bringing process experts together with climate modelers via CPTs is a useful means of improving representation of physical processes in large-scale IPCC-class models. CPTs improve the fidelity of coupled climate models by facilitating the transfer of knowledge from observational and process-oriented research to the development of physical process representation in global climate models.

The Office of Oceanic and Atmospheric Research (OAR) Climate Program Office Modeling, Analysis, Predictions and Projections (MAPP) Program and Climate Variability and Predictability (CVP) Program have previously funded Climate Process Teams, together with other federal agencies. In FY 2019, the MAPP and CVP programs are coordinating to invest in a new set of CPTs, in partnership with other Federal agencies participating in the USGCRP and US-CLIVAR.

In FY 2019, the MAPP Program, in partnership with the Department of Energy, Office of

[1] https://nca2014.globalchange.gov/

[2] https://usclivar.org/climate-process-teams

[3] Based on the input from modeling centers and participants from the October 2015 "Translating Process Understanding to Improve Climate Models " Workshop. https://usclivar.org/meetings/translating-process-understanding-improve-climate-models

Science, Earth and Environmental Systems Modeling Program, is soliciting proposals for CPTs focusing on accelerating the realism in the modeling of land processes as part of the Earth's climate system. (See the related FY 2019 CVP program announcement for additional Climate Process Teams opportunities).

Proposed CPT(s) will adhere to the US-CLIVAR definition:

> A CPT is funded multi-institutional project that assembles observation-oriented experimentalists, process modelers, process diagnosticians, theoreticians, and climate model developers from two or more modeling centers into a single project that focuses on a specific process or set of processes to assess model sensitivities to process uncertainties, establish observation and model metrics, and develop, test, and implement parameterization improvements.

Proposed CPTs must include collaborations with NOAA OAR and DOE laboratories, among other U.S. climate modeling centers, involve external academic and/or private-sector research scientists, and demonstrate the usefulness to improving NOAA and DOE climate models and those of other major U.S. modeling centers. Applicants must consider key findings and best practices based on past CPTs listed on the US-CLIVAR webpage for CPTs (https://usclivar.org/climate-process-teams).

CPT proposals for this competition will aim to speed development of global coupled climate models by focusing on land processes and their interactions as part of the climate system by bringing together theoreticians, observationalists, process modelers and the large modeling centers to concentrate on the leading problems facing models. Each CPT will comprise a number of PIs and institutions proposing as a collaborative group.

It is the objective of the CPTs to bridge the gaps among the field and remote sensing observation programs, process models, and global modelers by building communities, in which those with observational expertise and data, those with highly detailed process models, and those building global models work together to address systematically the critical issues that limit progress in improving global climate models. The CPT is envisioned to support collaborations that will accelerate progress in climate model development. Such support should include activities, such as visiting scientists, that give incentives for modelers and field scientists to interact, workshops or meetings for the teams to interact regularly, and computational resources to test and assess new parameterizations.

Proposed CPTs should focus on a specific land-related climate process or on an interaction among climate processes with the expectation that significant progress can be made, over the duration of the project, in improving its representation in global climate models. Such processes should meet the following criteria:

- Relevance: The process should be one that is currently poorly represented in climate models, but where improvement in representation could lead to better and more

credible climate simulations.

- Readiness: The process should be one where recent theoretical developments, process modeling, and observations are readily transferable into climate models.
- Focus: The topic needs to be focused and well defined so as to lead to concrete results within the duration of the project.
- Model independence: The process should be of interest to developers of more than one climate model.

Examples of land-related processes for which progress is needed as part of U.S. climate model development[4] are the land-planetary boundary layer processes, including those key to the representation of the diurnal cycle, and the heterogeneity in land-atmosphere coupling processes. Other key processes include evapotranspiration and precipitation recycling, vegetation dynamics and atmosphere interactions, land use and land management processes and feedbacks, disturbances such as floods, droughts, fires or pests, and land modeling processes relevant to coastal conditions and land-ocean coupling. Proposed projects should include a clear plan for model development, testing, benchmarking and analysis with the coupled system to demonstrate the impact of the model improvements.

The development of high-quality modular code and integration into multiple models is of particular interest, including features such as unit testing, process validation and verification, and documentation.

Proposed CPTs will demonstrate the availability of relevant observational datasets to help constrain modelled processes. For example, proposals will consider the usefulness of remote sensed dataset from SMAP, GFED, GRACE and other sources (e.g. radar, lidar, cosmic ray, GPS); field data like FluxNet, Ameriflux, SPRUCE, ARM/CART, ISMN, and NASMDB; experimental field campaigns; and the opportunity to have co-located observations. Note, the collection of new observations is beyond the scope of this solicitation.

Proposed CPTs will leverage land process understanding and modeling research from GEWEX and other coordinated activities, as appropriate. For example consider activities such as the Land Surface Model Benchmarking Evaluation Project (PLUMBER), Diurnal Cycle Coupling Experiment (DICE), Local L-A Coupling (LoCo) Project, the Protocol for the Analysis of Land Surface models (PALS), and the International Land Model Benchmarking (ILAMB); and the output from model intercomparisons such as the Land Surface, Snow and Soil Moisture Model Intercomparison Project (LS3MIP), and the Land Use Model Intercomparison Project (LUMIP), among others.

Proposed CPTs will aim at enhancing existing community process evaluation metrics and frameworks for model improvement such as those by NCAR, the PCMDI Metrics Package

[4] US Climate Modeling Summit 2018, “Land-Atmosphere Interactions and Extremes Workshop”, College Park, April 4th 2018 https://www.globalchange.gov/sites/globalchange/files/4th_USCMS_agenda_fnl.pdf

(PMP), ILAMB, and the MAPP Climate Model Diagnostic Task Force Process Oriented Diagnostics (PODS).

The CPT project management will be the joint responsibility of the lead PI and the management of the collaborating modeling institutions. Responsibilities include coordination of the collaborating PIs and institutions, serving as a focal point for the sponsoring agencies, meeting science milestones and model development goals, and reporting progress and results as required.

MAPP Program Manager Information: Annarita Mariotti (annarita.mariotti@noaa.gov)
DOE Point of Contact: Renu Joseph (Renu.Joseph@science.doe.gov)

Additional General Guidelines for Applicants

- Principal Investigators submitting a proposal in response to this MAPP Announcement are required to follow the Letters of Intent (LOI) and Proposal preparation and submission guidelines described in the Climate Program Office FY 2019 Federal Funding Opportunity announcement.
- Investigators are strongly encouraged to submit an LOI prior to developing and submitting a full proposal. Investigators are encouraged to submit using the FY19 MAPP Letter of Intent submission form[5]; investigators unable to submit via the form should email their LOI to oar.cpo.mapp@noaa.gov. Investigators will be notified by the MAPP Program as to whether a full proposal is encouraged based on the LOI within 30 days of the LOI due date.
- Proposals must clearly identify in their summary which MAPP competition is being targeted (only one competition may be targeted by a given proposal) and which sub-element of the competition is being targeted, if applicable.
- Administrative questions regarding the Federal Funding Opportunity (e.g. proposal formatting or submission guidelines) should be directed to Diane Brown (diane.brown@noaa.gov).

A webinar will be offered to potential applicants for background on the MAPP program and this solicitation soon after publication of this announcement. For Information on webinar timing and registration procedures please check the MAPP website and also sign-up to receive an email notification[6].

Data Archiving and Computational Resources

[5]Note, a Google account is needed to submit via this form: https://docs.google.com/forms/d/e/1FAIpQLSfrveTEkW_f6E06PvD4RjziGh9KtyXomjFKB61KOwL7pV6rLw/viewform

[6] https://docs.google.com/forms/d/e/1FAIpQLScoswYBrwTxvjNseONZ5HD3MEP8gbg8yPN19gdEVp3WTYdbUA/viewform

Computational Resources

Computational resources on NOAA and DOE high-performance computing platforms (HPC) may be requested for research sponsored as a result of this solicitation. Proposals should indicate the availability of alternative computing resources should NOAA/DOE resources not be available for the project.

Proposers who choose to request computational allocations on NOAA's platforms must include in their proposal a request describing the computational resources and data storage required, as well as a description of how they will port their methodology to the NOAA platforms. Proposers must submit an HPC Request Form with their proposal in order to apply for computational resources[7]. Questions regarding the use of NOAA's high-performance computing platforms should be directed to Dan Barrie (daniel.barrie@noaa.gov).

Computational resources on DOE's high-performance computer at NERSC may be requested for research sponsored as a result of this solicitation, with priority given to projects that are also supported by DOE. Instructions on how to apply are provided at the NERSC website (http://www.nersc.gov/users/accounts/allocations/).
Questions regarding the use of DOE high-performance computing platforms should be directed to Dorothy Koch (dorothy.koch@science.doe.gov).

Data Management Guidance

The MAPP Program requires that all products and deliverables produced via solicitation will reside in the open access / open source domain, freely available to the public.

Public access to grant/contract-produced data will be enabled in one of the following ways (select one):

- ❑ Funding recipients are planning to submit data to NOAA National Centers for Environmental Information (NCEI), which will provide public access and archiving[8]. Point of Contact for NCEI is Nancy Ritchey (Nancy.Ritchey@noaa.gov)
- ❑ Data are to be submitted to an International Council for Science (ICSU) World Data System facility: https://www.icsu-wds.org/community/membership/regular-members)
- ❑ An existing publicly accessible online data server at the funded institution is to be used to host these data (describe in proposal).

The Competition Manager (above) is the responsible NOAA Official for questions regarding this guidance and for verifying accessibility of data produced by funding recipients.

[7] https://cpo.noaa.gov/Portals/0/Docs/MAPP/MAPP_FY19_HPC_Request_Form.docx

[8] NCEI supports the creation of adequate metadata and data ingest into long term repository holdings using tools such as Send2NCEI (www.nodc.noaa.gov/s2n, for small volume, one-time only data collections) and Advanced Tracking and Resource tool for Archive Collections or ATRAC (www.ncdc.noaa.gov/atrac, for recurring and/or large volume data collections).